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## HALICTINE BEES FROM MOROCCO

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The present paper completes the account of the *Halictus* of my 1930 expedition to Africa. At different times I have tried to identify the small black species described below, the holotypes of which will be found in the American Museum, but always without success, and I can only conclude that there is a strong endemic element in and about the Atlas Mountains, with no doubt many more species than are at present known.<sup>1</sup>

The species of *Halictus* reported from N. W. Africa are as follows; those which have metallic (green or blue) colors on head and thorax are marked (M).

### A.—Species of the Canary Islands<sup>2</sup>

<i>arctifrons</i> E. Saunders	<i>implicatus</i> Smith
<i>chalcodes</i> Brullé (M)	<i>laetus</i> Brullé (M)
<i>concinus</i> Brullé (M) ( <i>microcardia</i> Pérez)	<i>villosulus</i> Kirby (not typical)
<i>fulvipes</i> Klug	<i>viridis</i> Brullé (M) ( <i>alcedo</i> Vachal)
	<i>viridis unicolor</i> Brullé

### B.—Species of the Madeira Islands

<i>frontalis</i> Smith ( <i>sepositus</i> Cockerell)
<i>villosulus</i> Kirby (not typical)
<i>wollastoni</i> Cockerell (M)

### C.—Species of the Azores

<i>malachurus</i> Kirby
<i>morio</i> Fabricius (M)
<i>villosulus</i> Kirby

It will be noted that the Canary Islands have six endemic species, and the Madeiras two; but all the species of the Azores are common European forms, and may well have been introduced.

<sup>1</sup> Benoist, reviewing the *Osmia* of Morocco, had to describe twelve new ones. Alfken (1935) reported on a large collection of *Osmia* from Palestine. Nine were new, all different from Benoist's Morocco species.

<sup>2</sup> Blüthgen (Com. Biol., VI, 1937) states that *H. implicatus* Smith is a synonym of *H. viridis unicolor* Brullé, and adds to the Canarian Fauna (from Gomera) *H. brevicornis* subspecies *aciculatus* Blüthgen var. *gomerensis* Blüthgen, based on the male.

D.—Species of Morocco (CXXVIII and CLXVI refer to 'Descriptions and Records of Bees,' in Annals and Magazine of Natural History. 960 refers to American Museum Novitates, November, 1937).

- albomaculatus* Lucas (960)  
*angustifrons* Vachal  
*asnicus* Ckll. (960)  
*aureolus* Pérez (M)  
*bequaerti* Blüthgen (M)  
*brevicornis* Schenck (infra)  
*callizonius* Pérez (960)  
*capitalis* Pérez  
     (*mauretaniae* Strand)  
*cochlearitarsis* Dours. (CXXVIII)  
*constantinensis* Strand  
*costulatus* Kriechbaumer (960)  
     (*alpestris* Morawitz)  
*exetinus* Ckll. (infra)  
*frigescens* Ckll. (infra)  
*fulvipes* Klug (CXXVIII)  
     (*sexcinctellus* Dours.)  
*gemmeus* Dours. (M) (CXXVIII)  
*ifranensis* Ckll. (CXXVIII)  
     (? = *intumescens* Pérez)  
*ifranicola* Ckll. (960)  
*immunitus* Vachal  
     (*scariosus* Pérez)  
*indecisus* Ckll. (infra)  
*interruptus* Panzer (960)  
*interruptus atlanticus* Ckll. (infra)  
*leucozonius* Schrank (960)  
*lucidellus* Ckll. (960)  
*lucidulus* Schenck (CXXVIII)  
*maculipes ventralis* Pérez  
*malachurops* Ckll. (960)  
*malachurus* Kirby (960)  
*malachurus sharificus* Ckll. (960)  
*maroccanus* Blüthgen  
*maurusius* Blüthgen  
*mesoleus* Ckll. (infra)
- minutissimus* Kirby (CXXVIII)  
*mogadoricus* Ckll. (960)  
*morio* Fabricius (M) (CXXVIII)  
*musculus* Blüthgen  
*nadigi* Blüthgen  
*optimellus* Ckll. (infra)  
*orontis* Ckll. (CXXVIII, as  
     *H. platycestus*)  
*pauxillinus* Ckll. (infra)  
*pauxillus* Schenck (infra)  
*perminutus* Ckll. (CLXVI)  
*phanerodontus* Ckll. (CXXVIII)  
*pici* Pérez (M) (*extorris* Vachal)  
*pollinosus* Sichel (M) (CXXVIII)  
*pseudoleptocephalus* Blüthgen (M)  
*punctatissimus* Schenck  
*quadricinctus* Fabricius  
*quadricinctus aegyptiacus* Friese  
     (CXXVIII)  
*rejectus* Ckll. (960)  
*rufipes* Fabricius (CXXVIII)  
     (*formosus* Dours.)  
*rufotegularis* Ckll. (infra)  
*rufolocinctus* Ckll. (960)  
*scabiosae* Rossi (CXXVIII)  
*scabiosae powelli* Ckll. (CXXVIII)  
*smaragdulus* Vachal (M)  
*sphecodimorphus* Vachal  
*subauratus* Rossi (M)  
*thevestensis* Pérez (M)  
*tinitinensis* Ckll. (CLXVI)  
*ultraparvus* Ckll. (CLXVI)  
*vestitus* Lepeletier (M) (CXXVIII)  
*villosulus* Kirby  
*villosulus perlautus* Ckll. (CLXVI)  
*virens* Erichson (M)

#### *Halictus pauxillus* Schenck

Morocco: Tangier, August 1, ♀ (Cockerell). Compared with specimens from St. Helens, I. of Wight, and Wangen, Baden, the head is smaller, and the front more shining. Blüthgen recorded male *H. pauxillus* from El Hajeb, remarking that it was not typical. Probably a distinct race should be recognized, but more material is needed.

**Halictus (Evylaeus) frigescens**, new species

FEMALE.—Length about 5.7 mm., anterior wing 4.7 mm.; black, shining, with scanty grayish-white hair. Head broad, circular seen from in front; clypeus rather prominent, polished, with widely scattered punctures; sides of face and front shining, but middle of front with excessively dense minute punctures, running in rows; flagellum obscurely reddish beneath. Mesothorax and scutellum polished, disc of mesothorax with sparse but distinct punctures, mostly running in rows; area of metathorax very large, appearing dull and little sculptured under a lens, the hind margin thickened; the microscope shows widely separated very delicate irregular vermiform rugae, not reaching the hind margin (*H. pauxillus* has much stronger, denser rugae); posterior truncation sharply defined all round; tegulae light rufotestaceous. Wings iridescent, faintly grayish; stigma very large, dusky reddish (in *H. pauxillus* pale dull yellowish); nervures pale, first recurrent joining second cubital cell near end. Legs black, the small joints of tarsi pale red, and the hind tibiae and tarsi distinctly brown; hind spur serrate, not spined. Abdomen broad, shining, with the hind margins of tergites conspicuously pallid; dull whitish tomentum at sides of bases of second and third tergites; first tergite with excessively minute punctures (only seen under microscope), not at all dense; second with dense minute punctures; venter with long white hair.

Morocco: Mogador, August 19, at flowers of white daisy (Cockerell). This agrees with no species recorded from Morocco or Algeria. In Blüthgen's table of Spanish species it runs straight to *H. pauxillus*, agreeing best with the vernal form *immarginatus* Schenck (*similis* Schenck). But it is readily distinguished from *H. pauxillus* by the sculpture of the metathorax, the color of the stigma, and other characters. The orbits strongly converge below, instead of being parallel as in *H. capitalis* Pérez. The specific name chosen is in allusion to the climate of Mogador.

**Halictus interruptus atlanticus**, new subspecies

In addition to a female from Ifrane, I have two males from Asni, Morocco, August 8 and 9 (Cockerell). Blüthgen (1923) recorded what must have been the same insect from Asni as *H. interruptus opacus* (Pérez). I have three females of *H. opacus* received from Pérez, two from Corsica and one from Sicily. On account of the dense punctures of the first tergite, they certainly have the aspect of a distinct species, but they agree with *H. interruptus* in the reddened wings. The insect from Morocco has the wings grayish in the female, clear hyaline in the male, not at all reddened. The first tergite has extremely dense small punctures in middle, and large well-separated punctures at sides. The sculpture of the area of metathorax is more delicate than in *H. opacus*, and the tegulae are much redder. It is evident that the insect from Morocco (taking the Ifrane female, collected by Miss Mackie, as the

type) represents a distinct race. Pérez described his *H. opacus* in his paper (1895) on the bees of Barbary, but gave no locality. His description agrees with the specimens he sent to me, and I assume that these are the genuine *H. opacus*, or *H. interruptus opacus* as Blüthgen has it. My males run exactly to *H. interruptus* in Blüthgen's table of Spanish *Halictus*, and Hedicke's German table.

***Halictus brevicornis* Schenck**

Morocco: Ifrane, August 29, male (A. Mackie). Exactly agrees with one from Argentat (Vachal).

***Halictus mesoleus*, new species**

MALE.—Length about 6 mm., anterior wing 5 mm.; black. The head broad, circular seen from in front, face and front covered with white hair; clypeus with the lower part very broadly yellow; labrum yellow; mandibles pale yellowish; front dull, but a shining depression in front of ocelli; flagellum clear ferruginous beneath, moderately long, about reaching scutellum. Mesothorax shining but very distinctly punctured; scutellum shining; area of metathorax with fine regular parallel plicae, the hind margin thickened, with a shining spot in middle; posterior truncation shining, sharply bordered at sides; mesopleura dull; tubercles pale at end; tegulae pellucid reddish. Wings hyaline, faintly grayish; stigma dull pale fulvous, with a dark margin; nervures pale; second cubital cell rather narrow. Legs black at base, but the tibiae pale, somewhat reddish, with a large dark patch, in the case of the middle tibiae, seen from without, only the ends are pale; tarsi cream-colored becoming a little rufescent apically. Abdomen convex, highly polished, the margins of the tergites dark; no evident hair-bands or spots, but there is a very little pale hair, hardly noticeable, at sides of bases of second and third tergites; fifth sternite finely pruinose-pubescent, broadly and deeply emarginate, sixth smooth and shining. The first tergite, as seen under the microscope, has strong sparse punctures, but in the middle of the disc is a large smooth area, with hardly any punctures.

Morocco: Ifrane, August, 1930 (Alice Mackie). In some respects this resembles *H. quadrisignatus* Schenck, but that has a black clypeus. The comparatively broad, white-hoary face suggests *H. villosulus* Kirby, but the orbits converge more below than in that species, and the yellow on clypeus is distinctive. In Blüthgen's Spanish table it runs near *H. interruptus*, which is quite different. There is no distinct median groove on mesothorax, such as there is in *H. ventralis* Pérez. There is a general resemblance to *H. mandibularis* Morawitz, but the abdomen is quite different.

***Halictus (Evylaeus) exetinus*, new species**

MALE.—Length about 5 mm., anterior wing 4 mm.; black, with scanty whitish pubescence, only moderately dense on face and front, the clypeus and supraclypeal area exposed. Head broad-oval, with the clypeus distinctly produced; supra-

clypeal area shining; clypeus well punctured, its lower margin narrowly yellow; labrum yellow; mandibles mainly yellow, with the end red; antennae long, reaching beyond scutellum, the flagellum pale dusky red (not at all brightly colored) beneath. Mesothorax shining, but quite closely and strongly punctured, the median groove distinct; scutellum shining; area of metathorax dull, with an obtuse thickened shining posterior margin; posterior truncation not sharply bounded at sides; tegulae rufofulvous. Wings hyaline, faintly dusky; stigma large, entirely red, without a dark margin; nervures pale; second cubital cell greatly narrowed above; first recurrent nervure meeting intercubitus; the oblique sides of third cubital cell nearly parallel. Legs black, with the small joints of tarsi dusky red, and a red spot on front knees. Abdomen moderately shining, distinctly and closely punctured, perhaps with a faint greenish tint, without hair-bands or spots. Microscopical characters: front extremely densely punctured; punctures of mesothorax well separated on a shining surface; area of metathorax with only feeble imperfect plicae; first and second tergites closely punctured, the punctures running largely in rows.

Morocco: Asni, August, 1930 (W. P. Cockerell). *H. maurusius* Blüthgen has the long face, but is a much larger species. There is some resemblance to *H. hollandi* E. Saunders, but that has the mesothorax minutely rugulose, and also differs by having the apices of first and second tergites deeply impressed. The species is not in Blüthgen's paper on the *Halictus* of Spain, nor in Hedicke's table of central European *Halictus*, and I find no other description to fit it.

#### ***Halictus (Evylaeus) indecisus*, new species**

FEMALE.—Length about 5.5 mm., anterior wing 4.3 mm.; black, robust, with scanty whitish hair, rather long and abundant on sides of thorax below; abdomen without distinct hair-bands or spots, a little pale pubescence at sides of base of second tergite. Head broad-oval, the clypeus moderately produced; mandibles reddened at tip; flagellum faintly brownish beneath; supraclypeal area large, shining; clypeus strongly punctured; front dull. Mesothorax shining, but strongly and rather closely punctured; scutellum closely punctured; area of metathorax with more than the basal half covered with dense parallel plicae, the part beyond shining; posterior truncation dullish, distinctly defined at sides except above; tegulae very dark, practically black. Wings grayish; stigma dark dusky reddish, nervures pale; second cubital cell very narrow on marginal; first recurrent nervure meeting intercubitus. Legs black, with white hair, pale yellowish on inner side of hind tarsi; spurs pale red. Abdomen broad, shining, hind margins of tergites not pallid; the fourth and fifth tergites have thin pale hair on lateral margins. Microscopic characters: clypeus and supraclypeal area strongly punctured; front very densely punctured, not striate; first tergite with fine rather dense punctures, failing in basal middle of disc; hind spur with four rather short oblique spines.

Morocco: Asni, August 10, 1930 (W. P. Cockerell). There is some resemblance to *H. gracilis* Morawitz, but that is much smaller, with quite different tegulae. *H. intermedius* Schenck is similar, but our species has a narrower face, and much more strongly punctured mesothorax.

***Halictus (Evylaeus) optimellus*, new species**

FEMALE.—Length about 6.3 mm., anterior wing 5 mm.; black, robust, with thin grayish-white hair, conspicuous on sides of thorax. Head broad, but suboval, not circular; mandibles faintly reddish apically; clypeus moderately produced, well punctured; supraclypeal area highly polished; front dull, a shining band along inner orbits; apical part of flagellum red beneath; mesothorax shining, with inconspicuous punctures; scutellum shining; area of metathorax dull, rugulose, but the thickened hind margin shining; posterior truncation with the upper part shining, the sides not sharply defined; tegulae rufous. Wings hyaline, the large stigma pale testaceous with a dark margin; nervures pale; second cubital cell moderately broad above; first recurrent nervure meeting intercubitus; third cubital cell large, its outer side strongly arched. Legs black, with small joints of tarsi rufous, spurs whitish. Abdomen moderately shining, without hair bands or spots, but much white hair on apical portion, the caudal furrow red; hind margins of second and following tergites pallid. Microscopic characters: supraclypeal area with minute widely scattered punctures; front very densely punctured, some minute cross-striation on lower part; disc of mesothorax with minute sparse punctures; plicae of area of metathorax connected by minute cross-striae; punctures of disc of first tergite excessively weak and sparse; hind spur very long, with six widely spaced oblique spines, but the last ones quite rudimentary.

Morocco: Ifrane, August, 1930 (Cockerell). Resembles *H. hellenicus* Blüthgen, having the same sort of stigma, but *hellenicus* has a much broader head. In the Spanish table it appears to run near *H. minutulus* Schenck, which has a smaller, quite different stigma, and does not have the shining apical margin of basal area of metathorax.

***Halictus (Evylaeus) pauxillinus*, new species**

FEMALE.—Length about 5.5 mm., anterior wing 5 mm.; black, robust, with very scanty whitish hair, not forming distinct bands or spots on abdomen. Head broad, circular seen from in front, the clypeus short, not produced; mandibles faintly reddish apically, the sharp inner tooth far from end; flagellum obscurely brown beneath. Mesothorax shining, the disc with distinct but well-separated punctures, median groove distinct; scutellum shining, but postscutellum entirely dull, in strong contrast; area of metathorax large, crescentic, sculptured all over, a little shining in certain lights, the posterior margin not shining; posterior truncation shining, not sharply defined at sides; tegulae very dark, almost black. Wings hyaline, faintly dusky; stigma pale dull testaceous; nervures pale; second cubital cell nearly as broad on marginal as third; first recurrent nervure meeting intercubitus. Legs black, with dull white hair, small joints of tarsi brownish; spurs white. Abdomen broad, moderately shining, the hind margins of third and fourth tergites narrowly pallid, much white hair in apical region, a little pale pubescence at sides of base of second tergite. Microscopic characters: tongue very short; punctures of mesothorax strong and well separated on disc; area of metathorax with distinct plicae from base to apex, in the middle third connected by little branches, forming an irregular reticulation; disc of first tergite with excessively weak widely scattered punctures, but the marginal area is distinctly punctured; tegulae minutely punctured on basal part only; hind spur with four short oblique teeth.

Morocco: Ifrane, August 26, 1930 (Alice Mackie). In Hedicke's table this runs nearest to *H. quadrisignatus* Schenck, which has a much darker stigma and much more coarsely sculptured area of metathorax. I cannot place it anywhere in Blüthgen's Spanish table, nor identify it with anything described from N. Africa. The stigma and metathorax suggest *H. pauxillus* Schenck, but that has the margins of the tergites pallid. At first I thought this might be the female of *H. exetinus*, but there are too many differences in details.

***Halictus (Evylaeus) rufotegularis*, new species**

FEMALE.—Length about 7 mm., anterior wing 5.5 mm.; black, rather elongated, with dull white hair, long and conspicuous about bases of antennae, region of scutellum, and under side of thorax. Head broad, circular seen from in front; clypeus shining, strongly punctured; supraclypeal area dullish, not elevated, closely punctured; front dull, narrowly shining along orbits; mandibles black; flagellum reddened at apex beneath. Mesothorax and scutellum highly polished, with fine sparse punctures on disc; area of metathorax crescentic, shining, with very strong plicae, the apical margin shining; tegulae large, red with a hyaline margin. Wings hyaline; stigma large, uniform red-brown; basal, marginal, and other nervures dark, but in central part of wing the nervures are very light, the outer recurrent and intercubitus hard to see. Legs black, with the small joints of tarsi reddened; hind tibiae with dense pure white hair. Abdomen shining, the first tergite highly polished, and appearing impunctate under a lens; there are no distinct hair-bands or patches, but thin white pruinose pubescence on third and following tergites, and long white hair at sides of fourth; apex with white hair; venter with a curled polliniferous scopa. Microscopic characters: mesothorax with large punctures on a smooth surface, and some extremely minute punctures between; hind spur with short sharp teeth.

Morocco: Ifrane, August 27, 1930 (Alice Mackie). *H. transitorius* Schenck (*planulus* Pérez) is allied, but our species is larger, with much broader head and different metathorax. The stigma is like that of *H. quadrisignatus* Schenck, but the abdomen and metathorax are different. In *H. quadrisignatus* the area of metathorax is shorter, very coarsely sculptured, and hardly shining. Compared with *H. indecisus*, this species is not only larger, but has the marginal cell notably longer in proportion.

The following key to small *Halictus* of Morocco, having black head and thorax, will facilitate identification.

- 1.—Females.....2.
- Males.....14.
- 2.—With bands of white felt at bases of tergites 2 and 3.....3.
- Without such bands.....4.
- 3.—Clypeus produced; sides of face polished; tegulae all dark.

*mogadoricus* Cockerell.

Clypeus not produced; sides of face not polished; tegulae red on outer side.

*interruptus* Panzer, *sens. lat.*

- 4.—Mesonotum dull; tegulae mostly dark.....5.  
     Mesonotum polished.....8.  
 5.—Head oval.....6.  
     Head broader.....7.

- 6.—Hind margin of first tergite narrowly red; median sulcus of mesonotum deep.  
     *tinitinensis* Cockerell.

Hind margin of first tergite not red; sulcus of mesonotum weak.

*indecisus*, n. sp.

- 7.—Larger, about 7.5 mm. long; weak bands on apices of tergites; stigma very pale.....*malachurus* Kirby, *sens. lat.*  
     Smaller; not nearly so hairy.....*pauzillus* Schenck, *sens. lat.*  
 8.—Area of metathorax dull, not distinctly plicate; mostly very small species....9.  
     Area of metathorax distinctly plicate; none very small.....11.  
 9.—Stigma pale yellowish; wings appearing milky and iridescent.

*pauzillinus*, n. sp.

- Stigma brown.....10.  
 10.—Larger, fully 6 mm. long.....*frigescens*, n. sp.  
     Very small.....*lucidulus* Schenck.  
 11.—Head rather narrow, clypeus produced; apical half of abdomen coarsely hairy.....*optimellus*, n. sp.  
     Head round; apical half of abdomen not thus hairy.....12.  
 12.—Area of metathorax shining, the plicae very strong.....*rufotegularis*, n. sp.  
     Area of metathorax dull, except on margin.....13.  
 13.—Area of metathorax with a thick shining margin, depressed in middle, the apical part polished.....*villosulus* Kirby, *sens. lat.*  
     Area of metathorax without such margin, the plicae going to margin.

*villosulus* Kirby, *sens. lat.*

- 14.—Abdomen largely reddish.....*malachurus sharificus* Cockerell.  
     Abdomen black, or in small part reddish.....15.  
 15.—Extremely minute, with light mark on clypeus; flagellum red beneath.....16.  
     Not thus minute.....17.  
 16.—Flagellum very long.....*asnicus* Cockerell.  
     Flagellum shorter; mesonotum with a strong sulcus....*ultraparvus* Cockerell.  
     Flagellum shorter; mesonotum without sulcus; head oval.

*perminutus* Cockerell.

- 17.—Clypeus with no light mark.....18.  
     Clypeus with a light mark.....19.  
 18.—Stigma very large, reddish.....*villosulus* Kirby, *sens. lat.*  
     Stigma smaller and paler.....*villosulus* Kirby, *sens. lat.*  
 19.—Flagellum clear bright red beneath.....20.  
     Flagellum dusky or dark.....24.  
 20.—Bands of white tomentum at bases of second and third tergites.

*interruptus atlanticus*, n. subsp.

- No such bands.....21.  
 21.—Smaller, with black hind tibiae; mesothorax shining....*brevicornis* Schenck.



- Larger, hind tibiae largely pale; hind margins of tergites pallid; mesonotum with anterior half dull..... 22.
- 22.—Abdomen without red..... *malachurus* Kirby, *sens. lat.*  
 Abdomen with some red..... 23.
- 23.—Second tergite red, with a black band.  
*malachurus sharificus* Cockerell, variety.  
 Second tergite black, with a transverse red mark.  
*malachurus sharificus* Cockerell, variety.
- 24.—No bands of white tomentum at bases of tergites..... 25.  
 Bands of white tomentum at bases of tergites..... 26.
- 25.—Hind margins of tergites reddened..... *rufulocinctus* Cockerell.  
 Abdomen all black..... *exetinus*, n. sp.
- 26.—Flagellum brown beneath; rather slender species..... *leucozonius* Schrank.  
 Flagellum black; tubercles black..... 27.
- 27.—Wings very long, with dusky suffusion; mesonotum polished and strongly punctured..... *costulatus* Kriechbaumer.  
 Wings not so, no dusky suffusion; thorax extremely hairy..... *callizonius* Pérez.

